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ABSTRACT

Instructional media systems might be of help in meeting the educational crisis of today, but it is difficult to find systems which reached the potential demonstrated in pilot efforts. Some of the more obvious reasons for the failures in educational technology are these: there is research but not development, equipment but no materials, a market but no customer, money but not enough, programs but no systems, and there is the belief of educators that teachers should have autonomy. Questions that represent an approach to cost effectiveness in the use of educational media are these: All things being equal, what does it cost? What can I buy for a small increment in cost? What is the critical mass necessary to produce educational results? Can I find others to share the cost? Can the rules be rewritten so that the price is right? Some of the difficulties in applying cost effectiveness analysis to education are that education is an open system; effectiveness, not efficiency is the better criterion; financing may be difficult; and so may measurement. What is needed to make educational technology effective is the critical mass to produce quality materials and regional networks for large audiences. Media systems, utilizing television and computers, will be used when they come to be regarded as necessities. (MF)

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MEDIA AND COST-EFFECTIVENESS

by

Andrew R. Molnar*

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EDUCATIONAL CRISIS

Today, a wide array of scientific and social developments are reshaping our society and with it modern education. Two of the more significant trends are the (1) scientific information explosion and with it the rapid access to information through modern telecommunications and (2) the trend toward equal opportunity of education. Both of these trends are altering what we teach and how we teach.

The body of scientific information is increasing exponentially and can be expected to double in the next 12 years. It is estimated that 90% of all the scholars who have contributed to the knowledge of mankind are alive today. New information has lead to the creation of new professions and has made other professions obsolete. On graduation, one can expect to have up to three professions in a lifetime. It is estimated that of the children entering school today, 70% will work in occupations that do not now exist. This dynamic increase and expansion of knowledge has greatly affected what we teach.

Equal opportunity has altered our nation's goal from providing education for the many to providing education for all. In the past, the student came, the teacher taught and the student passed or failed. Now the student comes to learn and the school system passes or fails. This trend has increased the stress on accountability in education. Given the new challenge, some say that education is failing; others say that we don't know how to teach. It is not that we don't know how to teach, but can we teach 40 students with a wide variety of backgrounds while permitting them to progress at their own individual pace, in inadequately designed buildings, with minimal materials for a cost-per-student-hour that is less than what we pay a baby sitter. Like a bridge designed for certain stress loads, we can fail if our critical limit is exceeded. More times than not, it is the limit that is in question and not our ability.

As greater demands are placed upon education and as the costs continue to rise, it is only logical to look to other approaches. More recently, attention has been placed upon designing media systems that permit teachers to effectively assist large numbers of students to attain specifiable levels of performance within acceptable cost limits.

PROBLEMS OF EDUCATIONAL TECHNOLOGY

Education is a labor intensive activity; more money is spent on salaries than any other item in the educational budget. Historically, the potential of technology has been the greatest in labor intensive activities. What has been the impact of large educational media systems and its related technology on the educational process? Many research projects have demonstrated the educational uses of television, computers, multi-media, dial-access and library information systems. However, in spite of the research, few institutions have adopted instructional media systems. Among those who have, it is difficult to find systems which reached the potential demonstrated in pilot efforts. These systems; characteristically have not reduced cost, improved quality or extended education.[1]

While there are many reasons for the failure to affect change some of the more obvious ones are:

RESEARCH BUT NO DEVELOPMENT

While limited funds are available for educational research and demonstration projects, little is spent to take research experiments out of the laboratory and into the school. The Department of Defense spends four dollars for development for every dollar spent on research. There is no similar innovative mechanism in education. Educators visit a demonstration project, and then go home and try to build it. They usually make the same mistakes as the originators and seldom get the innovation to work due to lack of development resources. While this form of innovation used to work for the transfer of education techniques, it is doomed to failure when it comes to building complex systems.

EQUIPMENT BUT NO MATERIALS

While State and Federal help is readily available for the purchase of buildings and equipment, little assistance is available for the development of high-quality materials. Low-budget, low-quality materials have put out of business more than one educational television network. If instructional systems are to be effective they require high-quality, tested materials. The costs of material development are high. It cost eight million dollars for twenty-six weeks of Sesame Street Programs, approximately seven million dollars for the Physical Science

Study Committee Curriculum, five million for Project Physics, 1.7 million for the initial materials developed under the Individually Prescribed Instruction program (IPI).

MARKET BUT NO CUSTOMER

As Dr. Theodore Levitt so insightly observed in his article "The New Markets – Think Before You Leap" in the *Harvard Business Review*, no school system in the country is large enough to amortize the development costs for technological systems.[2] Since school systems are autonomous elements with a wide variety of decision-making structures it makes it highly speculative for business and industry to undertake the risk. Levitt says it is not that the cost is too high, but that there is no customer. He says that the only customer that could cause the product to be produced is the most suspect and most unpopular – Uncle Sam.

ECONOMY AND AUTONOMY

We as educators firmly believe in the autonomy of the teacher to prepare and present materials and schools to make their own decisions. It does not matter that most will select the same materials and same methods. Technology on the other hand becomes economical when it is used with many students over great distances.

MONEY BUT NOT ENOUGH

Many feel that if more money was spent on educational media systems significant differences could be demonstrated. The Commission on Instructional Technology in their report "To Improve Learning" to the President and the Congress recommend that the Federal Government undertake the major responsibilities for basic, applied research, development, and application.[3] For this activity they recommend $565 million dollars for a National Institute of Education and $150 million for the National Institute of Instructional Technology.

Based on an analysis of funding of educational media in the U.S. Office of Education, it was estimated that in Fiscal Year 1967, the Office spent 4/5 of a billion dollars (including cost-sharing) on instructional materials, media and media related activities. In the four year period from Fiscal Year 1966 to 1969 it is estimated that 2.5 billion dollars have been spent on instructional materials, media and media related activities. In other words, the Federal Government has spent and is spending far more money than the most optimistic estimates of what is required. Unfortunately, these programs are so fractionalized that no cumulative results are obtainable.

PROGRAMS BUT NO SYSTEMS

While there are many excellent Federal programs, most are designed to handle limited parts of the overall problem. The fragmentation of administrations within the Office of Education and the State and local agencies precludes an overall attack on education problems through the use of educational technology. In order to handle education problems, it requires the pyramiding of grants through various pieces of legislation. All too frequently, projects fail because one or more pieces of support fails to materialize or restrictions within the legislation make it difficult to apply the funds to the solution of educational problems.

Although provisions are made for the research, training, equipment and facilities, it is rare that all of these elements are provided in any one grant for one program. Consequently, we find equipment being provided without training or materials, training institutes being provided for those without equipment. In short, seldom is a total system provided.

In summary, we have research but no development, media but no quality materials, ample money to create a large market but no customer, programs but few systems; in short, we have large costs but no benefits.

COST-EFFECTIVENESS APPROACHES

Probably no area, outside the Department of Defense, has received more intensive study than educational media. I would like to describe some of the more interesting approaches to cost-effectiveness.

ALL THINGS BEING EQUAL WHAT DOES IT COST?

Realizing the difficulties involved in evaluating the educational effectiveness of various media systems, the U.S. Office of Education commissioned a study with the General Learning Corporation to evaluate only the costs of educational media systems.[4] The researchers were to assume that the effectiveness of various media

systems were equal unless they were clearly and demonstratively not equal.* General Learning Corporation examined the cost-parameters of various media systems on a local, regional and national basis to determine if there was any significant change in the parametric cost characteristics. It is clear that total costs are markedly reduced when media systems operate for a large number of students on a regional or national basis.

WHAT CAN I BUY FOR A SMALL INCREMENT IN COST?

Frequently in education we ask ourselves what would the ideal learning system look like and what would it cost. Inevitably, the cost is so high that it precludes serious consideration. So, rather than designing the best system and pricing it, a strategy evolved that asked (1) what could be bought for a minimal increment in the education operating budget and (2) was the product educationally worth it. Three feasibility studies were undertaken to cost the development of a computer utility in a centralized facility that would service 100,000 students within a 100 mile radius at a minimal increment in cost and to evaluate the educational worth of the services to the institutions.[5] Interestingly enough, independent studies showed that it would be possible to provide the administrative computer services for schools, junior colleges and universities within this area during post school hours, while providing terminals for students for problem solving, computer concept training and vocational training during the school day – all for less than one percent of the school's operating budget.

WHAT IS THE CRITICAL MASS NECESSARY TO PRODUCE EDUCATIONAL RESULTS?

On the basis of early childhood research and the Head-Start experiences, it became apparent that the pre-school years are critical in the formation of a child's learning behavior and significantly affect his later educational performance. If a major pre-school program was to be undertaken it would require massive investments for new buildings, curriculum and teachers. Educational television was considered as an alternative. Most families, including low-income families, own television sets and learning could take place at home rather than in a classroom. Some argued that you could not maintain a child's attention with educational materials and it would be impossible to compete with commercial animated cartoons. Others argued that the reason for the poor showing of educational television was the low level of programming support. They pointed out that while educational television programs ranged in the $1,000 budget level, Walt Disney type productions were in the $200,000 plus range. They argued that educational programs required a "critical mass" support before results would begin to flow. They argued that the lack of resources lead to low-quality programming and ineffective results. Subsequently, the Sesame Street project was undertaken with the assumption that enough money would be provided to insure that education television (ETV) could attain a critical mass level so that ETV could be evaluated as an alternative way of pre-school education. The combination of a creative production and research staff have demonstrated that given sufficient funds, ETV can compete with commercial broadcasting and that programming can be designed to maintain the pre-school learner's attention for longer than a few minutes. While early results also confirm that learning is taking place, further research is required to determine the kind and amount for various types of learners.

CAN I FIND OTHERS TO SHARE THE COST?

The development of multi-purpose, multi-function systems can ofttimes bring the cost of media systems into line with our pocket book. For example, the computer utility project plans to combine administrative data processing done at night with instructional uses during the day. Some have suggested that if all the data processing required for medical records were done on a national basis that the saving could more than cover the costs of providing every doctor in the country with a computer terminal remoted from a medical library. Others have suggested using state-wide television net-

**Interestingly enough there is evidence to suggest that "the equal effectiveness" assumption is a reasonable one. Robert Dubin and Thomas C. Taveggia in their study "The Teaching-Learning Paradox: A Comparative Analysis of College Teaching Methods" reviewed 91 studies and concluded that there are no differences among a wide range of teaching technologies and that in any cost-benefit analysis, cost is the major consideration.*

works at night for broadcasting and copying instructional materials for delayed broadcast the next day and using the network during the day-time hours for an interactive computer system for instructional uses.

In the state-wide study of telecommunications in the State of Illinois it was found that over half of the costs to the state were associated with higher education.[6] Significant savings were realized by combining accounts.

CAN WE RE-WRITE THE RULES SO THAT THE PRICE IS RIGHT?

Under this approach we look beyond the costs of the immediate activity to the total costs. Next, we seek to reallocate costs for various activities such that the total cost remains the same but the easing or procedures can facilitate achieving the end goal. For example, it has been suggested that if automobile accident claims were paid without court action to determine liability that the costs of insurance would not increase and may even be cheaper. The telephone companies use a wide-area dialing permits users to call long-distance without the high costs associated time and distance criteria.

There are many areas where this type of consideration could be used. Recently, the U.S. Office of Education altered its copyright policy of public domain to permit limited copyright of materials (including films, and CAI programs) developed under grants and contracts. In the past, many excellent curriculum packages sat on the shelf unused. With the new change in the rules, it is now possible to use the marketing mechanisms of commercial publishing houses and increase the probability that materials will be used.

In one multi-state educational, computer-assisted instruction project the communications line costs amounted to 45% of the entire project. If educational discounts for telecommunication were allowed to encourage the sharing of resources, it might be possible to reduce the federal assistance required by the various schools on an individual basis.

If one considers the total cost to society of not educating, it becomes clear that we spend huge sums of money outside the educational system to accomplish what could be done for a fraction of the cost within the system. What are the trade-offs between preventive medicine through education and remedial medicine in such areas as dental care and contagious diseases? Unfortunately few studies have been conducted to determine the total costs to society for those who receive no education or ineffective education and end-up on welfare or institutionalized in prisons or hospitals. Cost-effectiveness studies of total systems may well demonstrate ways to significantly increase spending on education while reducing total costs to the nation.

DIFFICULTIES ASSOCIATED WITH THE COST-EFFECTIVENESS CONCEPT

There are a number of difficulties associated with the cost-effectiveness concept in education.

EDUCATION – AN OPEN SYSTEM

In trying to determine the cost-effectiveness of educational systems it must be realized that education is not a closed system, there are many factors that affect the educational product. For example, the average child spends more time in front of his television set than in the classroom. Some of these factors like family environment, peers, socio-economic status have as much an impact upon the learner as a formal educational system. Therefore, in any cost-effectiveness analysis, it is difficult to demonstrate that changes in learning are a function of a new educational media system.

THE EFFICIENCY CRITERION

Frequently, cost-effectiveness studies seek to determine what is the best system for the lowest cost. This type of analysis fails to take into account the realities of the education environment. If we devised an educational system that could cut-in-half the school day, it is unlikely that students would be sent home. Many parents work and would object to such a practice. Instead, efficiency must be thought of in the sense of how to get the most out of the time allocated for schooling. Some efficiency experts note that there is redundancy in the school curriculum and there seems to be a good deal of wasted time. This reminds me of the story of the efficiency expert who did a study of a symphony orchestra. He observed that many musicians played the same theme (duplication of effort), and that themes were often repeated (unnecessary redundancy); and that some musicians sat idle during many parts of the session (over-supply of manpower or feather bedding). This story stresses the need to look at the total

effect for occassionally the analysis of parts may lead to invalid conclusions. Effectiveness, rather than efficiency, is probably the more meaningful goal in education.

Some argue that we should support only those activities that produce the greatest results. Programs aimed at the superior student often produce dramatic results for a relatively small cost. However, our system is also concerned with equity. Consequently, we frequently support many expensive programs for the handicapped and the disadvantaged that produce only small improvements. In this case the consequences of funding are more important that the intermediate results. It would be morally difficult to withhold funds until some ideal educational solution is found.

COST AND COOPERATIVE FINANCING

Many complain that they cannot afford the purchase of expensive closed circuit television systems or large digital computer networks, yet most could afford the costs-per-student-hour if someone were to develop a central facility and charge payments on a use basis. Frequently when it comes to the use of educational media systems cost is not the determining factor – finance is.

MEASUREMENT

One of the major difficulties in cost-effectiveness analysis is the measurement problem. Many of the relations involved in the cost-effectiveness ratio are non-linear. While many media systems can educate students for but a few cents-per-student-hour, the figures are usually based upon total utilization of the system. Most systems have high basic fixed costs and costs-per-student-hour increase rapidly as we move away from total utilization. Many costs are step-incremental. It costs little to add one student to a class of thirty. However, if there is no room and if a new section must be formed, a new teacher and new classroom must be found and the step cost is significantly greater.

Many costs are non-convertible. State and Federal Law specifies how the money must be spent. In California, 80% of the current expenditure budget is completely allocated to those programs that are mandated by the State; 60% of the elementary school current expenditure budget must be allocated for classroom teachers salaries. Many states specify maximum teacher-student ratios for school districts. Total funds are not free budgets that an administrator can allocate as he pleases.[7] Cost-effectiveness analyses that do not take into account this non-convertible factor yield deceptive findings.

Cost-per student hour can also be a deceptive index. This may represent one student on a computer-assisted instruction terminal, or 100 students using the same terminal for a computer simulation game. Frequently cost-per-student-hour estimates exclude curriculum development costs. They assume that the teacher will develop the materials on his own time. Others include curriculum development costs but base their estimates on using material already developed. Still others include curriculum development, testing and revision costs. Since curriculum development costs may be the major costs in television and computer systems, it is critical to know how these costs are calculated.

In comparing systems, it is critical that the total-life-cycle costs be taken into account in any cost-effectiveness analysis. Initial purchase, curriculum development and operating costs as well as replacement costs must be taken into account in order to estimate the total costs of a system. An inexpensive system may have a one or two year life before it must be replaced. A more expensive system may last many years. Therefore, only estimates of the total-life-cycle costs permit valid comparisons among media systems and other alternative modes.

Many cost-effectiveness studies are based upon the input-output model. One might question whether this is an appropriate model for education. Are there other models that would yield different cost-effectiveness findings? In any analysis, the choice of the model may determine the outcome, consequently it is advisable to explore other models to determine if they yield similar results.

If the information explosion is changing education; if of those entering school today, 70% will work in jobs that do not exist; if individuals will have several professions in a life time, it is clear that a static model of education is appropriate. The future is uncertain and in the face of uncertainty, the best strategy to follow is one that maximizes the alternatives available to the student so that when he reaches a choice-point in life he will have the skills and information necessary to cope with the future. In this probabilistic model we are more concerned with evolving a long-term strategy for an indi-

vidual with changing goals in a dynamic world than defining concrete objectives in a static world. We would be more concerned with the consequences of a student not being exposed to certain concepts and skills than our ability to state behavioral objectives and to specify the discrete bits of information necessary to reach them in some minimal time period.

IS EDUCATIONAL TECHNOLOGY EFFECTIVE?

In evaluating the effectiveness of educational technology, it must be remembered the technology is more than the mere use of equipment to reach educational goals, it also includes process and procedures. Reid and MacLennan reviewed 350 studies on research in instructional television and film;[8] Robert Dubin and R. Alan Hedley[9] analyzed well over one-hundred studies of television and their findings agree with Dr. Godwin Chu and Dr. Wilber Schramm[10] that "the effectiveness of television has now been demonstrated in well over 100 experiments, and several hundred comparisons, performed in many parts of the world, in developing as well as industrialized countries, at every level, pre-school through adult education, and with a great variety of subject matter and method."

Between 1954 and 1964 over 190 reports of original research were completed on programmed instruction and it was found that programmed instruction is effective for "college, high school, secondary, primary, pre-school, adult, professional, skilled labor, clerical employees, military, deaf, retarded, and imprisoned. Using programs, students were able to learn mathematics and science, foreign language, spelling, electronics, computer science, psychology statistics and many other subjects."[11]

There are 110 studies on individually prescribed instruction and it can be concluded that IPI students do as well as non IPI students.[12] This is even more impressive since IPI tests are not normative but are instead performance based. Similar findings are also available for computed-assisted instruction and other forms of media.[13] [14]

In summary, if television is used merely as a window and CAI, programmed instruction and IPI are used as self-teaching devices, the media are as effective as a conventional teacher. If these media are extended to those who receive little or no education, migrant workers, the rural poor, those of the urban ghetto, they can significantly alter education. If these media are tied into networks over which high-quality, tested materials are presented they also can be cost-effective. If television is used for its magnification qualities, slow-motion presentations or its playback features, if the computer is used to permit students to work with higher order concepts, these education devices become more than media – they are educational tools.

Sesame Street and the work in CAI has demonstrated that it is possible to engineer materials that will achieve learning effectiveness. Given a "critical mass" necessary to produce quality materials and regional networks, to deliver the program to large audiences, the cost-effectiveness of media systems can also be demonstrated.

THE PROBLEM, THE SOLUTION AND HOW TO PUT THEM TOGETHER

Today, society is placing more and more demands upon education and is seeking to hold educators responsible for their educational product. Educational systems technology has the potential for solving many of today's educational problems. Media systems are not widely used primarily because of the "no customer problem," but this too is changing. A number of local school districts and private schools throughout the country are failing because of the lack of a financial support. Several states are considering state-wide financing of education. A number of institutions of higher education are also in financial difficulties and are considering cooperative efforts. These trends are creating a reorganization of the financial base into larger units capable of purchasing and effectively using media systems.

While the concept of cost-effectiveness is one analysis that can usefully be applied to the evaluation of media systems, it should not be considered to be the only criterion for action and because of its limitations must be discrimately applied. It is strange that in a land where there are enough telephones for every man, woman and child and where many of these instruments sit idle most of the day and others are used for countless hours by teenagers discussing trivia and its use in one state by higher education accounts for more than half of the state's budget for telecommunications, no one questions the cost-effectiveness of this medium. The library with

its thousands of books that sit idle, its large reserve of duplicate copies and its large expensive physical plant receives large financial investments without question. The reason for this is obvious – these media are educational necessities. When other educational media systems such as television and computers become necessities because students learn and teachers prefer to teach in this manner and more people may be reached more quickly and conveniently, then and only then will media systems be used. We know the problem, we have a viable answer; now, we must learn how to put them together.

REFERENCES

1. Andrew R. Molnar. "Ten Years of Educational Technology," *Educational Broadcasting Review,* June 1969.
2. Theodore Levitt. "The New Markets – Think Before You Leap," *Harvard Business Review,* May-June, 1969.
3. Sterling M. McMurrin (Chairman) Commission on Instructional Technology. "To Improve Learning," A Report to the President and the Congress of the United States (Washington, D.C.: U.S. Government Printing Office, 1970).
4. General Learning Corporation. Cost Study of Educational Media Systems and Their Equipment Components (3 volumes), 5454 Wisconsin Avenue, Washington, D.C. 20015 May 1968.
5. IBM, "Feasibility Study for a Remote Terminal Central Computing Facility Serving School and College Institutions," Washington, D.C., 1967

   General Learning Corporation "A Feasibility Study for a Remote Terminal Central Computing Facility for an Educational System," Washington, D.C., 1968.

   Computation Planning Inc., "Functional Analysis and Preliminary Specifications for a Single Integrated Central Computer System for Secondary Schools and Junior Colleges," Bethesda, Maryland, 1968.
6. State of Illinois Telecommunications Commission, Report C: Final Report, System Development Corporation, Santa Monica, California, February 1969.
7. Marvin C. Alkin. "Problems of Schools in Introducing New Technology," in "The Application of Technology to Education," American Society for Engineering Education, Washington, D.C., 1969.
8. J. Christopher Reid and Donald W. MacLennan. Research in Instructional Television and Film. (Washington, D.C.: U.S. Government Printing Office, 1967).
9. Robert Dubin and R. Alan Hedley et. al., "The Medium May Be Related to the Message," Center for the Advanced Study of Educational Administration, Eugene, Oregon, 1969.
10. Godwin C. Chu and Wilbur Schramm. "Learning From Television: What the Research Says," Institute for Communication Research, Stanford University, 1967.
11. Wilbur Schramm. "The Research on Programmed Instruction: An Annotated Bibliography," (Washington, D.C.: U.S. Government Printing Office, 1964).
12. "A Progress Report: Individually Prescribed Instruction," Research for Better Schools, Inc., Philadelphia, Pennsylvania.
13. Albert L. Hickey. "Computer-Assisted Instruction: A survey of the Literature," ENTELEK, Inc., Newburyport, Massachusetts, October 1968.
14. Robert Dubin and Thomas C. Taveggia. "The Teaching – Learning Paradox: A Comparative Analysis of College Teaching Methods," Center for Advanced Study of Educational Administration, University of Oregon, Eugene, Oregon, 1968.